

We claim:

1. A method of determining the pre-load on a screw that secures a component to other components in a dental implant system comprising:
 - a. Transmitting a sonic impulse at a predetermined frequency to the head of the screw through a transducer when the screw is in an unstressed condition;
 - b. Measuring a first delay between first and second reflections through the unstressed screw, and establishing a baseline value for the unstressed screw;
 - c. Applying a preload of a predetermined value to the screw to secure implant components together ;
 - d. Transmitting a sonic impulse at a predetermined frequency to the head of the preloaded screw through a transducer;
 - e. Measuring a second delay between the first and second reflections through the preloaded screw to establish a preload value; and
 - f. Determining the difference between the first delay and the second delay to establish a difference between the baseline value and the preload value, and comparing the difference with a predetermined table of values to determine the preload on the screw.
2. The method of claim 1 wherein the sonic impulse is an ultrasonic impulse.
3. The method of claim 1 wherein the screw secures an abutment to an implant.
4. The method of claim 1 wherein the screw secures a dental prosthesis to an abutment.
5. The method of claim 1 wherein the screw secures a dental prosthesis directly to an implant.
6. Apparatus for determining the preload on a screw in a dental implant system that includes at least one screw for securing components of the dental implant system together, wherein the dental implant system includes at least a fixture having one end adapted for osseointegration into a jawbone, the other end adapted to receive an abutment, and the abutment adapted to receive and support a dental prosthesis, the apparatus further comprising
 - a. Means for applying a preload to the screw to secure at least some components

- of the implant system together;
- b. Means for transmitting a sonic impulse at a predetermined frequency to the head of the screw;
 - c. Means for transmitting the sonic impulse through the screw and detecting first and second reflections of the pulses;
 - d. Means for measuring the delay between the first and second reflections through the preloaded screw to determine a preload value; and
 - e. Means for determining the difference in the delay between a pre-established baseline value for the screw and the preload value, and comparing the difference with a predetermined table of values to determine the preload on the screw.
- 7. The apparatus of claim 1 wherein the sonic impulse is an ultrasonic impulse.
 - 8. The apparatus of claim 1 wherein the screw secures an abutment to an implant.
 - 9. The apparatus of claim 1 wherein the screw secures a dental prosthesis to an abutment.
 - 10. The apparatus of claim 1 wherein the screw secures a dental prosthesis directly to an implant.
 - 11. The apparatus of claim 1 wherein the means for transmitting a sonic impulse is an apparatus that produces an ultrasonic impulse.
 - 12. The apparatus of claim 1 wherein the means for transmitting the sonic impulse through the screw and detecting first and second reflections of the pulses is a transducer.
 - 13. The apparatus of claim 12 wherein the transducer is affixed to the head of the screw.
 - 14. The apparatus of claim 12 wherein the transducer is affixed to a wand, and the wand is in electronic communication with an electronic control and measurement circuit.